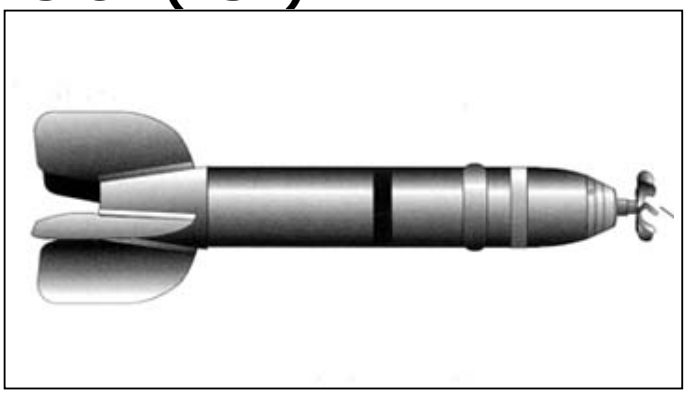
RS-82 (132)



Country: **USSR (Russia)**

Type: **Rocket**

In pre-revolutionary Russia, rockets filled with black powder were used. Combat missiles of this type were removed from service in the 60s and 70s. XIX century, and lighting were in service until 1917. Since 1919, the design of rockets with engines running on smokeless powder began.

In the early 1930s. the first experiments were made with 82-mm and 132-mm aircraft missiles. These calibers were not chosen by chance. The thing is. That the experiments were carried out with powder bombs with a diameter of 24 mm. Their size is determined by the 2 main caliber of rocket chambers - 82 mm and 132 mm, which were then preserved for a long time. If 7 sticks with a diameter of 24 mm are tightly packed into a cylindrical combustion chamber, then the inner diameter of the latter will be equal to 72 mm. The thickness of the chamber walls is 5 mm, hence the diameter, or caliber of the projectile, 82 mm. In the same way, the rocket caliber 132 mm appeared.

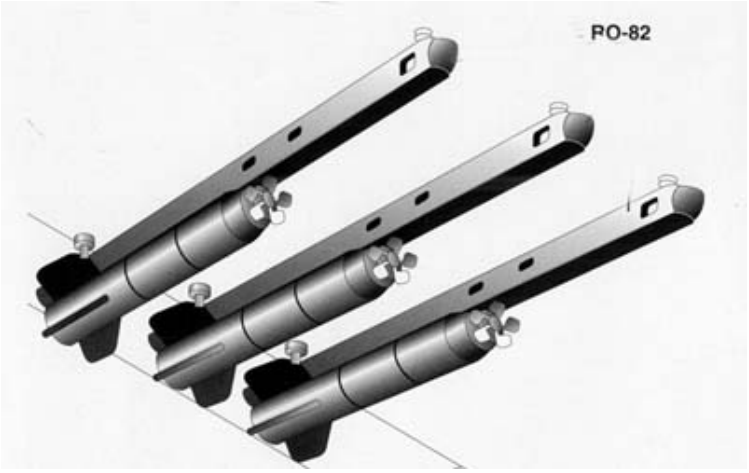
Naturally, the question of stabilizing missiles immediately arose. Many experiments were carried out to create turbojet missiles of 82 mm and 132 mm caliber. At the end of November 1929, ground firing of 82-mm **PC-82**turbojet projectiles was carried out . A few months later, test pilot S. I. Mukhin fired TRS-82 from the U-1 aircraft. The accuracy of the turbojet projectiles was unsatisfactory. In addition, with this stabilization method, about 28-30% of the weight of the rocket charge was spent on the rotation of the projectile, and the forward speed and flight range as a result decreased.

In this regard, it was decided to switch to wing stabilization of missiles without their rotation. Initially, 82-mm projectiles were tested with an annular stabilizer that did not go beyond the dimensions of the projectile. However, experimental shooting and blowing in the TsAGI wind tunnel showed that it is impossible to achieve stable flight with the help of an annular stabilizer.

Then they fired 82-mm rockets with a four-bladed tail swing of 200, 180, 160, 140 and 120 mm. The result was quite definite: with a decrease in plumage, flight stability and accuracy worsened.

Further, during the experiments, it turned out that with a swing of less than 120 mm, stable flight did not work - the shells began to tumble right after the engine stopped working. The plumage with a span of more than 200 mm turned out to be too heavy and shifted the center of gravity of the projectile back, which also led to a deterioration in flight stability. Facilitation of the tail by reducing the thickness of the stabilizer blades caused strong vibrations of the blades up to their breakage in the air. In the end, the optimal dimensions of the stabilizers were found: a span of 200 mm for 82 mm missiles and 300 mm for 132 mm missiles.

In 1935, the PC-82 missiles were launched from the I-15 fighter. In 1935-1936. PC-82 missiles were fired from aircraft tow-type launchers, which had high drag and significantly reduced aircraft speed.



Launcher RO-82

In 1937, the RNII developed a groove-type guide with one bar, which has a T-shaped groove for the projectile guide pins. To increase the strength, the guide was attached to a load-bearing beam made of a pipe. This design is called "flute".
Later, in launchers for the **PC-132,** the support beam-pipe was abandoned and replaced with a U-shaped profile. The use of flute-type launchers significantly improved the aerodynamic and operational characteristics of the projectiles, simplified their manufacture, and ensured high reliability of the projectile descent.

By 1942, the following main aircraft launchers were created: On I-153 aircraft. I-16 and Il-2 for PC-82 and RBS-82 (armor-piercing) shells, launchers with a length of 1007 mm were used. The length of their guides was 835 mm, the number of guides was 8. The weight of the entire rocket system was 23 kg. On SB aircraft, launchers with a length of 1434 mm were used for the PC-132 and RBS-132 shells. The length of their guides was 1130 mm, the number of guides was 10. The weight of the entire rocket system was 63 kg. On Il-2 aircraft, launchers with a length of 1434 mm were used for the PC-132 and RBS-132 projectiles. The length of their guides was 1130 mm. The number of guides is 8. The weight of the entire rocket system is 50 kg.

RS-82 under the wing of a LaGG-3 fighter

It is not for nothing that it says "the main types of launchers." The fact is that the Air Force, as well as the Army and the Navy, produced a significant number of semi-handicraft launchers for 82-mm and 132-mm rockets.

The world's first combat use of a new missile weapon took place in 1939. During the defeat of the Japanese troops on the Khalkhin-Gol River from August 20 to 31, the first link of missile-carrying fighters in the history of aviation successfully operated. It consisted of 5 I-16 fighters, armed with PC-82 rockets. On August 20, 1939, at 16 o'clock, Soviet pilots I. Mikhailenko, S. Pimenov, V. Fedosov and T. Tkachenko, under the command of Captain N. Zvonarev, flew out on a combat mission to cover our troops. Above the front line, they met with Japanese fighters. At the signal of the commander, all five fired a simultaneous missile salvo from a distance of about a kilometer and shot down two Japanese aircraft. Soviet missile-carrying fighters took part in fourteen air battles and shot down thirteen Japanese aircraft.

These numbers were usually cited by all the eminent authors who wrote about unguided rockets, and ... put an end. However, the attentive reader has a question - why, then, were not all fighters armed with rockets and removed machine-gun and cannon armament from them? In fact, the successful use of the PC-82 against Japanese fighters was due to a combination of extremely favorable circumstances. Firstly, the surprise factor worked - the Japanese initially mistook the explosions of the rockets for the explosions of 76-mm anti-aircraft shells. Secondly, the Japanese fighters flew horizontally at a constant speed in a tightly closed formation. Shooting

unguided rockets with a contact fuse at maneuvering fighters is tantamount to shooting "into the white light, like a pretty penny."

During the Soviet-Finnish War (1939-1940) 6 SB twin-engine bombers were equipped with launchers for PC-132 missiles. The PC-132 missiles were launched against ground targets.

In 1940, a number of aviation units of the Red Army were armed with PC-82 and PC-132 shells. In 1940, the factories of the People's Commissariat of Ammunition released 125.1 thousand PC-82 missiles and 31.68 thousand PC-132 missiles.

In 1942, the PC-82 and PC-132 aircraft shells were upgraded and received the M-8 and M-13 indexes.

Field firing with standard RS-82 and RS-132 rockets conducted at the NIP AV Air Force KA, as well as the experience of the Il-2 combat use at the front, showed the insufficient effectiveness of this type of weapon when operating on small targets due to the large dispersion of shells and, hence, low probability of hitting the target.

The average percentage of hits of the RS-82 in the tank of the aiming point when firing from a distance of 400-500 meters, shown in the materials of the report, was 1.1%, and in a column of tanks - 3.7%, while only 7 out of 186 shells fired were received direct hits. The height of the approach to the target is 100 and 400 meters, the gliding angles are 5-10 and 30, respectively, the aiming range is 800 meters. Shooting was carried out with single shells and a salvo of 2, 4 and 8 shells.

During the firing, it turned out that the RS-82 can defeat German light tanks of the Pz II Ausf.F, Pz 38 (t) Ausf.C type, as well as the Sd Kfz 250 armored vehicle only with a direct hit. A break in the RS-82 in the immediate vicinity of the tank (0.5-1 meters) does not inflict any damage on it. The smallest probable deviation was obtained in a salvo of 4 RSs at a gliding angle of 30.

The results of the RS-132 firing were even worse. The attack conditions were the same as when firing the PC-82, but the launch range was 500-600 meters. The probable circular deviation in range of the PC-132 at the gliding angles of the Il-2 25-30 was about 1.5 times higher than for the PC-82, and for gliding angles of 5-10, it practically coincided.

To defeat a light and medium German tank with a PC-132 projectile, only a direct hit was required, since when the shell burst near the tank, the latter did not receive significant damage. However, it was very, very difficult to achieve a direct hit - of the 134 PC-132 shots fired in the field conditions by pilots with varying degrees of training, not a single hit was received on the tank ...

Note that the averaging of the results of firing rocket projectiles, carried out by NIP AV Air Force specialists, without taking into account the degree of preparedness of the pilots, the number of projectiles in a salvo and the planning angles of the attack aircraft, cannot be considered correct when assessing the real effectiveness of the PC when acting on ground targets.

The negative experience of the combat use of PCs at the front is mainly due to the increased (600-700 meters) ranges of shells and not using the entire PC set in one salvo.

The engineering and technical staff of some combat aviation units, trying to increase the combat effectiveness of the Il-2, carried out on their own the completion of the attack aircraft, providing the suspension of an increased number of PCs on the aircraft. For example, at the beginning of 1942, on the North-Western Front, two serial Ila were equipped with 8 PC-82 and 8 PC-132 suspension by local craftsmen and then successfully tested in battles. In addition, in the combat units there were variants of "humpback" with a suspension of 24 PC-82. Despite the increase in the combat effectiveness of the attack aircraft modified in this way, the installation of an increased number of PCs on the Il-2, due to a significant decrease in the aircraft's flight speed, was soon abandoned.

In the Il-2 arsenal, along with the RBS-132 missiles, which had an armor-piercing warhead, the ROFS-132 missile was firmly entrenched by this time as a means of combating German armored vehicles with improved accuracy compared to RBS-132 or PC-132 shooting.

The warhead of the ROFS-132 projectile ensured through penetration (with a direct hit) of the armor of medium and heavy German tanks.

When the ROFS-132 burst near the tank at a distance of 1 m from it at an elevation angle of 30, the kinetic energy of the fragments was sufficient to penetrate German tank armor up to 15 mm thick. At an elevation angle of 60, the ROFS-132 rupture at a distance of up to 3 meters from the tank ensured penetration by fragments of tank armor 30 mm thick, the dimensions of the holes in this case were equal on average (20-25) x (35-80) mm.

If ROFS-132 directly hit the side of, for example, the StuG IV assault gun (or the side of the Jgd Pz IV / 70 tank destroyer), 30-mm armor penetrated, and the gun, equipment and crew inside the tank, as a rule, were disabled. ROFS-132 hitting the Pz. IV led to the loss of the tank.

Unfortunately, despite the increase in the accuracy of the ROFS-132 firing, their effectiveness when firing at tanks and other armored vehicles in dispersed battle formations, to which the Germans everywhere had passed by this time, was still unsatisfactory. The ROFS-132 gave the best results when firing at large area targets - motorized columns, railway trains, warehouses, batteries of field and anti-aircraft artillery, etc.

Destruction in the MTO of the German tank Pz Kpfw 38 (t) by a direct hit from the RS-132

Modification	RS-82	ZS-132
Caliber, mm	82	132
Projectile length, mm	600	845
Explosive weight, kg Projectile weight	0.36	0.9
, kg	1.1	3.8
Total projectile weight, kg	6.8	23.0
Maximum projectile speed (excluding carrier velocity), m / s	340	350
Maximum range, km	6.2	7.1
Radius of continuous destruction by fragments, m	6-7	9-10
Dispersion when firing at ground targets , thousandths of range	14-16	14-16

List of sources:

- Aviation and Time. Evgeny Arseniev, Nikolay Semirek. Jet armament of MiGs
- Wings of Russia. History and aircraft of the OKB MiG